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COMPUTER SCIENCE

NEWSLETTER

No. 69

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Edited by Mr. C. Alan Ford

IN THIS ISSUE

Page

System Reliability	1
User Option Service Levels	2
System Changes	3
Production Data	3
Problems with the PDP-8/s	5
Service Schedules for the Undergraduate Terminals	6
UTCC Personnel Changes	6
SSBs Issued	6
Book Review	7
Technical Tips	8
Appendix A	A-1
Roadmap Updates	
Appendix B	B-1
Computer Research Facility	

SYSTEM RELIABILITYS/360-65 No. 1 under HASP/MVT

The past month has been sad, with 11.3% of production time lost because of system or site malfunctions. The MTBF was only 7.5 hours, comparable with last November when the figures were 18.7% lost time and 4.3 hours MTBF. Since that date we have been averaging 3 to 4% lost time and 10 to 15 hours between failures.

The main source of problems has been IBM hardware, accounting for 66.2% of all down time. Most of this was attributed to a fault in core memory which vanishes whenever a fix is attempted and reappears again later. Air conditioning failures accounted for 16.1% of down time despite the fact that we have both primary and auxiliary systems. Software and other problems accounted for the remaining 17.7%.

S/360-65 No. 2 under HASP/MVT

As on System 1, it has been a troublesome month, with 9.6% of production time lost because of system or site malfunctions. The MTBF was only 8.9 hours.

Again hardware is the chief source of problems, accounting for 64.5% of all down time. One third was because of hardware problems encountered at ASUT when it reopened after the summer. The remaining time split evenly between Console, Tape Drive, Card Reader/Punch and 2314 disk drive problems. These problems are now apparently solved. The remaining problems were split between Air Conditioning 21%, Software 13.8% and other 0.7%.

It is worth noting that during the month the major changes were OS/MVT Release 18.6 and a HASP modification which provides a more efficient means of servicing the Undergraduate Terminals. These changes caused most of the software failures. It is unfortunate but true that such changes can't be fully debugged without putting them into production. We believe we have now overcome the problems and we thank you for your patience.

SYSTEM RELIABILITY (Cont'd)7094 II and 1401

This system continues to function reliably. The 1401 had minor printer and reader problems and the 7094 had a fault in the 7631 Control Unit and in the 7111 arithmetic unit. Both of these problems were caught early before users could experience problems.

USER OPTION SERVICE LEVELS *

There has been a decrease in both RUSH and IOI activity over the past month with many users reverting to ASAP as the load builds up. All users should study the backlog notices posted at two hourly intervals in the input area (Sandford Fleming Room 109) when determining what service level best suits their needs.

Don't forget Class V service on System 2. It is lightly loaded. Turnaround on this system is normally as fast or faster than RUSH but at ASAP prices, for jobs requiring less than 110K, no mounts and no TIC014 disk pack.

The workload on all systems will now be escalating sharply, with a corresponding increase in turnaround times. Nothing will be gained by submitting all work at RUSH priority. Use this service level only when it is vital that output be returned very quickly.

The service level breakdowns for September compared with August follow:

	Percentage of total workload	
	<u>September</u>	<u>August</u>
RUSH (R, S)	16%	21%
ASAP (A,B,E,C,D)	55%	44%
IOI (I,J,M)	29%	35%
	100%	100%

*Definitions

Jobs in RUSH Classes R, S preempt service from all other classes.

Jobs in ASAP Classes A,B,C,D,E are serviced As Soon As Possible, subject to preemption by RUSH.

Jobs in IOI Classes I,J,M are run only If the systems would be Otherwise Idle.

SYSTEM CHANGES

In Newsletter 68 we described a variety of system changes which were being effected, most of which pertained to improvement of overall turnaround and throughput capacity. Upgrades to HASP, the improvement of the undergraduate terminal High Speed Job Stream arrangements, upgrades to several remote terminals, and the addition of a third 2314 disk storage unit have all been carried out effectively. The full benefit of the third 2314 has not yet been felt, owing to tuning difficulties with OS Release 18.6. This Release is now operative in S/360 #2, which has experienced some degradation in reliability which relates in part to this Release. Computer Centre staff and IBM specialists have been very active in helping us towards the high degree of reliability previously experienced with System 2. OS 18.6 may then be cleared for implementation on S/360 #1.

A second and vital part of our systems activity concerns the maintenance of the computer language processors themselves. The many languages supported in our system are all serving well and reliably, with only a very small number of snags. The staff of the Computer Centre is developing improved methods for investigating and correcting this type of system bug. Since these bugs affect the users directly, in comparison with the indirect effects of operating system reliability and efficiency, this work is considered to be of primary importance.

PRODUCTION DATA

Table I, which shows the number of jobs processed for the first three months of the current academic year, indicates the expected upturn in activity from the August low point. This is true in moderation for the System/360 services and more strongly for the High Speed Job Stream. The slump in 7094 work since July seems to be levelling out in September.

Table II provides a comparison of production between the months of September 1969 and September 1970. The trend toward S/360 service and away from 7094 is clearly seen. A substantial upward trend in High Speed Job Stream services is also shown.

PRODUCTION DATA (Cont'd)

The September production figures are all well below the total capacity of our systems. By and large, user departments have not been short of allocated computer funds. Turnaround has been good. Idle capacity exists particularly in the 7094. Our resources should therefore be able to support the anticipated growth of demand in a reasonably graceful style.

Users are reminded that the 7094 and the Class V HASP job stream are two particularly under-exploited resources. Furthermore, there is considerable space available for the online storage of user libraries and data files. Anyone who can place their files into the online 2314 disks can improve his own turnaround and help us increase the total productivity of the S/360 systems. The Users' Service Group personnel will be happy to discuss with you how best to exploit our various resources.

	Jul	Aug	Sept
<u>System</u>			
S/360	12,780	10,983	11,058
7094	2,304	1,666	1,597
HSJS	12,748	10,465	24,067
TOTAL	28,532	23,114	36,722

TABLE I No. of Jobs Processed, July, August, September, 1970.

PRODUCTION DATA (Cont'd)

	Sept.69	Sept.70	Change
<u>System</u>			
S/360	4,794	11,058	+131%
7094	4,413	1,597	- 64%
HSJS	14,705	24,067	+ 64%
TOTAL	23,912	36,722	+ 54%

TABLE II Comparison between September 1969
and September 1970.

PROBLEMS WITH THE PDP-8/s

The PDP-8/s media conversion system has recently proven itself unreliable in the transfer of data from paper tape to magnetic tape. The staff of the Centre is searching for both long-term and short-term relief from these difficulties. We are increasing maintenance service to this machine immediately and are considering alternative devices to permit us to bypass the problem. A very limited group of users are affected by these problems. We would appreciate any affected user making his problems with the PDP-8/s known to the Operations Manager, Mr. Wickens.

SERVICE SCHEDULES FOR THE UNDERGRADUATE TERMINALS

November 1, 1970 - April 22, 1971

ASUT

9:30 a.m. - 5:00 p.m. Monday through Friday

EUT

* 9:30 a.m. - 10:00 p.m. Monday through Thursday

9:30 a.m. - 5:00 p.m. Friday and Saturday

* NOTE: EUT will be closed from 6:00 p.m. to 7:15 p.m.
for System Testing from December 14th, 1970 to
January 28th, 1971.

UTCC PERSONNEL CHANGES:

Effective October 19th, 1970 Roy Finlayson will assume the duties of I/O Supervisor, in place of Harold Wermel, who is moving to Australia at the end of October.

Ismay Goodliff and Clement Chow departed the ranks this month but UTCC is pleased to welcome back Murray Tucker after a short absence and to extend a welcome to newcomer William Cundiff, from the U.S.

In mid-October Miss Ann Couto took time out to become Mrs. Alfred DeFazio - lucky Alfred!

SSBs ISSUED

55:70	SIMON70 Processor Now Available Through High Speed Job Stream
56:70:1	Changes to MSGLEVEL Default Option under Release 18.6
2	Problems with PL/1 under Release 18.6
57:70	Schedule for Thanksgiving Holiday Weekend

BOOK REVIEW

Computer Languages, Peter C. Sanderson, Philosophical Library Incorporated, 1970.

Mr. Sanderson, a senior lecturer in computing at the Wandsworth Technical College, London, England, has produced a modest volume which does an excellent job of illustrating the main features of five specific, higher level computer languages. The five languages are ALGOL 60, FORTRAN, COBOL, PL/I, and extended Mercury Autocode. The latter inclusion is an outcome of the national origin of the book. At best this chapter may provide the greatest interest of any in the volume. The North American reader will not otherwise be distressed at the British flavour.

Three initial chapters provide a general introduction to digital computers, a similar introduction to computer programming itself, and then a brief treatise on the notion of computer languages. These chapters are satisfactory as essential stepping stones for the previously uninformed reader. The active student or practitioner in the field of computer programming may cheerfully branch directly into the chapters on the languages themselves.

No one should expect from this book a thorough education either in the subject of computer programming or of the specific languages. The text itself does not hesitate to point out how easily implementation-dependency penetrates the fine ideal of universality of these languages. The fly leaf commends the book "to professional people who may wish to write the occasional program". We might add that a copy of the manual for the specific language processor would also be a necessary investment.



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TECHNICAL TIPS

Some Problems with DO loops using IBM S/360 FORTRAN IV

Two problems have been encountered recently in which users have violated the rules for DO loops and have encountered inconsistent results either between level G and H of FORTRAN or, for a particular FORTRAN, from one OS Release to another.

1. Transfers into an inner DO. If two nested DO loops end on the same CONTINUE statement then an IF statement in the outer DO cannot cause a transfer to the CONTINUE. This is because it is, in effect, a transfer into the inner DO. Although this coding is not flagged at compile time and may sometimes work, it should be avoided as the results cannot be guaranteed. The correct way to code this is to use two CONTINUE statements, one to end each DO loop.
2. Last statement in the range of a DO loop. This cannot be a logical IF statement containing a GO TO statement (7094 users note that this restriction was not present in 7094 FORTRAN IV). This error is flagged by the G level compiler but not the H level one at present. However, there is no guarantee that future Releases of the H level compiler will not do so since the language manual forbids this construction. Users converting 7094 programs should use the recommended procedure of debugging using the G level compiler and change all flagged statements. The time taken to do this at conversion time is well worthwhile and could avoid much trouble later.

In all cases where the user is in doubt he should refer to the section PROGRAMMING CONSIDERATIONS USING A DO LOOP on pages 38 and 39 of the FORTRAN IV Language Manual (IBM Form C28-6515-7).

TECHNICAL TIPS

Use of File-Protected Tapes in FORTRAN Programs

The use of file-protected tapes in FORTRAN programs generates an operator message every time the tape is either read for the first time or rewound and read again. Some jobs generate so many of these messages that the operators have been cancelling them.

Under Release 18.6 it is possible to suppress these messages by using the IN positional subparameter in the LABEL parameter which defines the data set on tape as being one which is read only.

E.G:-

```
//FT01F001 DD DSN=IC.MYDATA,DISP=ØLD,UNIT=2400,  
// VØL=SER=N1234,LABEL=(1,SL,IN)
```

Use of SORT Verb in COBOL

Issuing a SORT verb within the output procedure of a SORT verb will cause an abend while executing a STOP RUN statement. The abend occurs in the SORT module and the region size increases by 48K.

This situation should be avoided by COBOL users.

TECHNICAL TIPS

Some Tips for More Efficient Use of CPS

In recent months there have been a number of queries and comments about the execution speed of the Conversational Programming System, with comparisons being made to commercially available services. It may be valuable to consider some technical features of CPS and other systems.

CPS and some other services, including APL, operate interpretively. That is, the source code is inspected and acted upon more or less directly at execution time. In other systems, a compilation step is required first, producing conventional object code for the subsequent execution step. The interpretive process serves particularly well in the interactive environment. On-line syntax checking and the ability to change coding in the program without recompiling are useful attributes of this method. Execution speed is not, however, so fast as the conventional compile/compute systems.

Understanding this method of operation should help provide a better appreciation of the situations where CPS can be economically used. These will obviously include applications where the interactive capabilities of the system are necessary. CPS can also be used in debugging PL/1 programs or testing algorithms for use in larger programs which are being developed. CPS should not be used for high volume processing because of the interpretive nature of the processor described above. Rather, problems of this nature should be directed to the High Speed Job Stream or the standard batch job processing streams. The variety of services available from the Computer Centre allow users a set of good economic alternatives.

For CPS users some rules and hints follow which should be of assistance in getting maximum service out of the system:

1. CPS has a limit of 3 pages (about 12K bytes of core) for any one procedure it can handle. Increasing the number of pages available to a user account or sub-account does not circumvent the 3 page limit for an individual procedure. This means that 3 pages is an absolute limit for programs coded in BASIC, while in PL/1 the program may be split into several procedures and the overlay feature used;

Some Tips for More Efficient Use of CPS (Cont'd)

2. the default option for declaring variables in PL/1 is dec(14) (i.e. 14 digit precision or double precision on the S/360). If your problem does not require this precision, both running time and space can be saved by declaring variables dec(6) (i.e. single precision). In BASIC, all variables are stored as double precision;
3. avoid the use of subroutine and function procedures in PL/1 wherever possible. When they have to be used, remember that an internal procedure is imbedded in the calling program, so that all variables declared in the main program are available to the internal procedure. Pass through the argument list only those variables which are to change each time the procedure is called;
4. avoid the use of many DATA statements in BASIC as this uses up part of the 3 pages allowed the program. If data is not expected to change frequently it is better to set it up on disk as a separate file and read it as required;
5. if a program is saved and subsequently reloaded variables will contain whatever values they were assigned when saved. Thus it is possible to set up data which changes infrequently in the program and avoid reading it every time the program is executed. This holds for both PL/1 and BASIC programs.

APPENDIX A

UNIVERSITY OF TORONTO COMPUTER CENTRE
Sandford Fleming Laboratories

ROADMAP UPDATES

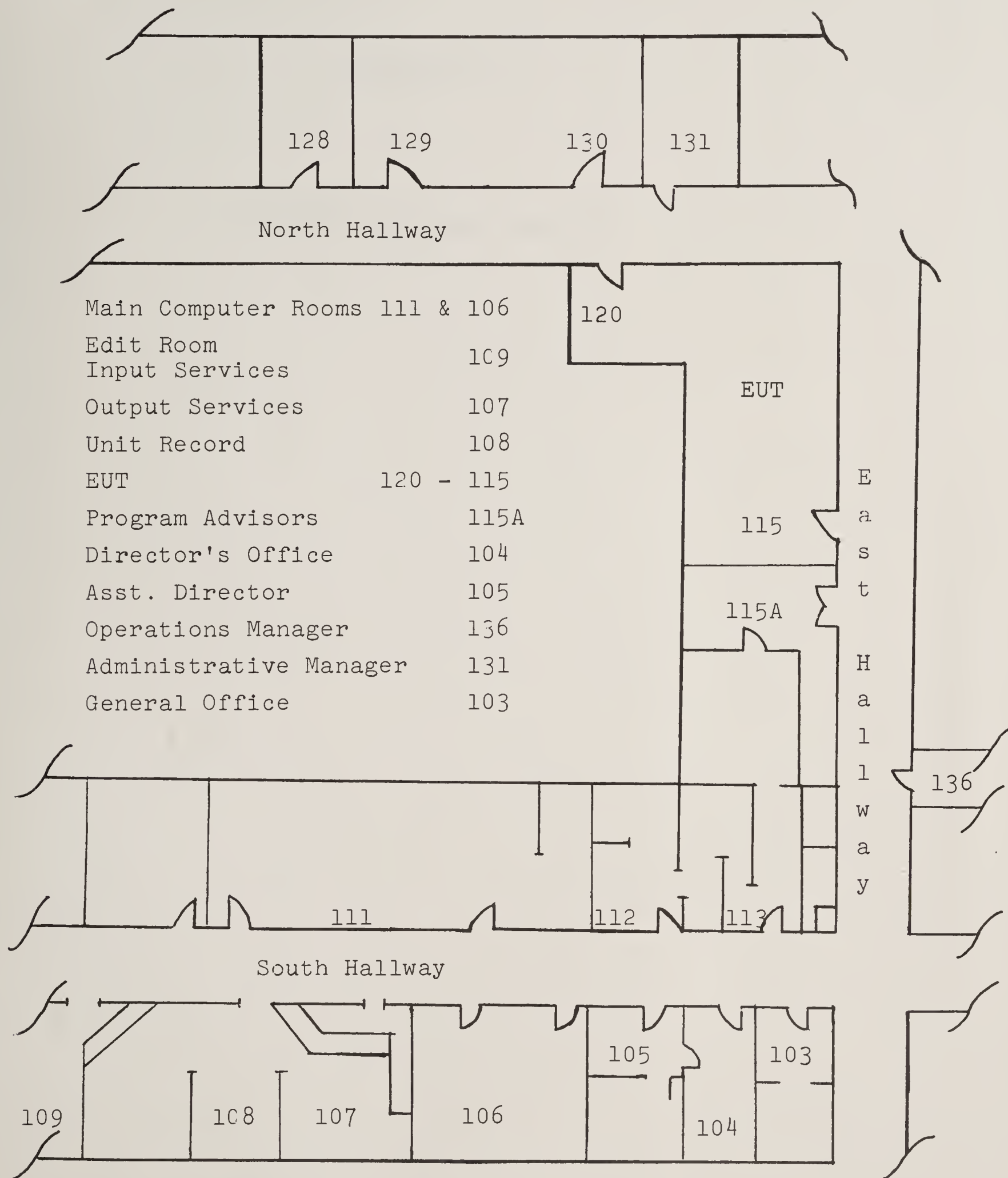
The following two pages constitute updates for the UTCC ROADMAP, last published in Newsletter 67, August 28, 1970.

KEY PERSONNEL

DIRECTOR	Dr. J. C. Wilson	Room 104
ASSISTANT DIRECTOR	Mr. C. A. Ford	Room 105
Secretary	Mrs. Ann Herring	Room 105
Quality Control Chairman	Mr. Peter Vincent	Room 115A Room 130
OPERATIONS MANAGER	Mr. A. J. Wickens	Room 136
Chief Operator	Mr. D. Tough	Room 112
System Custodian	Mr. D. Rauch	Room 112
I/O Supervisor	Mr. R. Finlayson	Room 108
Crew Chiefs	D. Burness D. Hart	Room 112
Data Collection Supervisor	Mr. L. Daniel	Room 113
Tape/Disk Custodian	Mrs. P. Armstrong	Room 111
USERS' SERVICE GROUP MANAGER	Mr. R. Williams	Room 128
Supervisor of Programming Advisors	Mrs. C. Davidson	Room 115A
System Advisors	Mr. R. Soderstrom Mr. L. Chu Miss R. Choudhury	Room 129
Numerical Analyst	Mr. R. Lemmens	Room 129
ADMINISTRATIVE MANAGER	Mr. J. Palter	Room 131
Design Analyst	Mrs. R. Greer	Room 129
Author. Clerks	Mrs. M. Rankin Mrs. C. Pidcock	Room 103
SOFTWARE SYSTEMS MANAGER	Mr. J. R. Swenson	49 St. George St.
Programmers		

UNIVERSITY OF TORONTO COMPUTER CENTRE
Sandford Fleming Laboratories

FLOOR PLAN



APPENDIX B

COMPUTER RESEARCH FACILITY

COMPUTER RESEARCH FACILITY

1. C.R.F.'s New Offices.
2. Preparing for MFT.

1. C.R.F.'s New Offices

CRF has moved its general offices from room SF2739 to room SF2740 in the Sandford Fleming Laboratories. The new offices are located directly across the hall from the old offices.

Since several telephone numbers have also been changed, a complete list of room and telephone numbers is given below.

	<u>Room Number</u>	<u>Telephone Number</u>
General Enquiry	SF2740	8946
Systems Manager (J.R. McBride)	SF2740	4086
Secretary (Sue Raab)	SF2740	4086
Hardware Support(C. Stevens)	SF2770	8853
Operations (K. Patnaik)	SF2770	8853
Software Support(L. Milland)	SF2750	5271
Computer Room	SF2770	8858

2. Preparing for MFT

CRF will shortly be implemeting an O/S 360 MFT II system on the 360/44. This will necessitate some changes in JCL and operating procedures. Courses will be provided for programmers using CRF to enable them to make the necessary changes before the implementation of MFT II. For details regarding these courses contact Mrs. L. Milland (5271).

